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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/650,040	Applicant(s) BARTUR ET AL.	
	Examiner Natalie Lennox	Art Unit 2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *August 28, 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *January 28, 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

> It does not state that the person making the oath or declaration acknowledges the duty to disclose to the Office all information known to the person to be material to patentability as defined in 37 CFR 1.56.

The duty to disclose, as stated in applicant's Oath/Declaration, is incorrect, it should read: "I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with the Title 37, Code of Federal Regulations Section 1.56."

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

For the following 35 U.S.C rejections refer to MPEP 2106.01 an excerpt of which is presented here:

I. FUNCTIONAL DESCRIPTIVE MATERIAL: "DATA STRUCTURES" REPRESENTING DESCRIPTIVE MATERIAL *PER SE* OR COMPUTER PROGRAMS REPRESENTING COMPUTER LISTINGS *PER SE*

Data structures not claimed as embodied in computer-readable media are descriptive material *per se* and are not statutory because they are not capable of causing functional change in the computer. See, e.g., *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure *per se* held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory.

Similarly, computer programs claimed as computer listings *per se*, i.e., the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035. Accordingly, it is important to distinguish claims that define descriptive material *per se* from claims that define statutory inventions.

Claims 27-30 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The above-mentioned claims are non-statutory because the term "data structure" may be interpreted as non-functional descriptive subject matter that is not contained on a medium with which to realize the functionality that is claimed. The claims recite a system that is analyzed as descriptive material *per se*.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 8-14, 16, 27-36, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Tzirkel-Hancock et al. (US 2002/0032566).

As per claim 1, Robinson teaches a speech recognition system comprising:

a reference library to store a plurality of reference words, each having a multiplicity of states (Paragraph [0003], *In a limited vocabulary system, speech recognition is performed by comparing features of an unknown utterance with features of known words which are stored in a database* (word model 19 of Fig. 2), also Paragraph [0141], *Fig. 22 shows an example word model 201 which comprises a sequence of states* S_0 *to* S_9 *derived during a training session, and an exit state* S_D *at the end of the word model*); and

a speech recognizer to match an input signal to one of said plurality of reference words, said speech recognizer having an active range storage unit to store a multiplicity of active ranges defining said states on whom recognition operations are to be performed for a current frame (Paragraph [0068], *The operation of the limited vocabulary continuous speech recognition system with reference to Fig. 2 uses electrical signals representative of the input speech are applied to a preprocessor which converts the input speech signal into a sequence of parameter frames, each representing a corresponding time frame of the input speech signal. The sequence of parameter frames are supplied to a recognition block where the speech is recognized by comparing the input sequence of parameter frames with reference models or word models 19, each model comprising a sequence of parameter frames expressed in the*

same kind of parameters as those of the input speech to be recognized, also in Paragraph [0142] *the word model 201 also has associated therewith a current active list 203 for the current frame f_k which lists, in descending order, the states in the word model that are at the end of a valid path for the current frame f_k. Therefore, each state in the current active list 203 will store the cumulative distance of the valid path that ends at that state, […] states on the current active list 203 will be referred to as active states.*).

As per claim 9, Tzirkel-Hancock et al. teach the speech recognition system comprising:

a reference library to store a plurality of reference words, each having a multiplicity of states (Paragraph [0003], *In a limited vocabulary system, speech recognition is performed by comparing features of an unknown utterance with features of known words which are stored in a database* (word model 19 of Fig. 2), also Paragraph [0141], *Fig. 22 shows an example word model 201 which comprises a sequence of states S_0 to S_9 derived during a training session, and an exit state S_D at the end of the word model*); and

a speech recognizer to match an input signal to one of said plurality of reference words, said speech recognizer to determine a multiplicity of active ranges defining states to be processed for each frame and to perform recognition operations for said frame only on states within said active ranges (Paragraph [0145] states that *[i]n step s73* (of Fig. 24) *the system then checks to see if there are any active states in the current active list 203. In other words, a check is made to see if there are any valid*

paths ending in the current word for the current frame f_k. In the present example there are seven active states in the current active list 203 and the system processes each in turn. A count variable i is provided, which is used to count through the active states on the current active list 203, and which is set to zero in step s75 and incremented in step s79 until all the active states in the current active list 203 have been processed.).

As per claim 27, Tzirkel-Hancock et al. teach a data structure for a speech recognition system, the data structure comprising:

a multiplicity of active ranges, each active range defining states to be processed in a current frame and each active range comprising (Paragraph [0145] states that *[i]n step s73* (of Fig. 24) *the system then checks to see if there are any active states in the current active list 203. In other words, a check is made to see if there are any valid paths ending in the current word for the current frame f_k. In the present example there are seven active states in the current active list 203 and the system processes each in turn. A count variable i is provided, which is used to count through the active states on the current active list 203, and which is set to zero in step s75 and incremented in step s79 until all the active states in the current active list 203 have been processed.*):

a beginning state of said active range, wherein said beginning state is the first active state (It is inherent from Fig. 23 that each of the end states s_7, s_5, s_4, s_3, s_2, s_1 and s_0 have a starting state associated with them and as can be seen in Fig. 23, for example, for end state s_7, there is a starting state s_4 associated with it, and end state s_5 has starting state s_2 associated with it, and so on.); and

an end state of said active range, where said end state is the last state able to become active in said current frame (Paragraph [0143] states that *Fig. 23 shows seven valid paths p1 to p7 which represent seven possible matching between the incoming word and the word model 201 up to the current frame* f_k. *As shown, the seven valid paths p1 to p7 end at word model 201 states* s_7, s_5, s_4, s_3, s_2, s_1 *and* s_0 *respectively, and it is these end states of the valid paths that are listed, in descending order, in the current active list 203.*).

As per claim 31, Tzirkel-Hancock et al. teach the method of recognizing speech, the method comprising:

determining active ranges for each frame to be processed (Paragraph [0142], *The word model 201 also has associated therewith a current active list 203 for the current frame* f_k *which lists, in descending order, the states in the word model that are at the end of a valid path for the current frame* f_k. *Therefore, each state in the current active list 203 will store the cumulative distance of the valid path that ends at that state [...] the states on the current active list 203 will be referred to as active states.* Also paragraph [0145] states that *in the present example there are seven active states in the current active list 203 and the system processes each in turn.*); and

performing recognition operations for each said frame only on states within said active ranges (Paragraph [0145] states that *[i]n step s73* (of Fig. 24) *the system then checks to see if there are any active states in the current active list 203. In other words, a check is made to see if there are any valid paths ending in the current word for the current frame* f_k. *In the present example there are seven active states in the current*

active list 203 and the system processes each in turn. A count variable i is provided, which is used to count through the active states on the current active list 203, and which is set to zero in step s75 and incremented in step s79 until all the active states in the current active list 203 have been processed.).

As per claims 2, 10, 28 and 32, Tzirkel-Hancock et al. teach the speech recognition system according to claims 1 and 9, the data structure for a speech recognition system according to claim 27, and a method for recognizing speech according to claim 31, having at least one active range per reference word (Fig. 22 shows word model 201 and active list 203 having 7 active ranges for the reference word model 201.).

As per claims 3, 11, and 33, Tzirkel-Hancock et al. teach the speech recognition system according to claims 2 and 10,and the method of recognizing speech according to claim 32, wherein each said active range has a start state and an end state and wherein said start state is the first state to be processed in said word for said current frame and said end state is the last state to be processed in said current frame (Paragraph [0143], *Fig. 23 shows seven valid paths p1 to p7 which represent seven possible matching between the incoming word and the word model 201 up to the current frame f_k. As shown, the seven valid paths p1 to p7 end at word model 201 states s_7, s_5, s_4, s_3, s_2, s_1 and s_0 respectively, and it is these end states of the valid paths that are listed, in descending order, in the current active list 203.* It is inherent from Fig. 23 that each of the end states s_7, s_5, s_4, s_3, s_2, s_1 and s_0 have a starting state associated with them and as can be seen in Fig. 23, for example, for end state s_7, there

is a starting state s_4 associated with it, and end state s_5 has starting state s_2 associated with it, and so on.).

As per claims 4, 12, 29 and 34, Tzirkel-Hancock et al. teach the speech recognition system according to claims 2 and 10, the data structure for a speech recognition system according to claim 28, and the method of recognizing speech according to claim 32, wherein each said active range minimally comprises the active states within said reference word (Paragraph [0142], *The word model 201 also has associated therewith a current active list 203 for the current frame* f_k *which lists, in descending order, the states in the word model that are at the end of a valid path for the current frame* f_k*. Therefore, each state in the current active list 203 will store the cumulative distance of the valid path that ends at that state.*).

As per claims 5, 13, 30 and 35, Tzirkel-Hancock et al. teach the speech recognition system according to claims 4 and 12, the data structure for a speech recognition system according to claim 29, and the method of recognizing speech according to claim 34, wherein each said active range also comprises at least one inactive state not able to become active in said current frame (Fig. 23 shows state 6 of word model 201 which is inactive and is not able to become active in frame f_k.).

As per claims 6 and 14, Tzirkel-Hancock et al. teach the speech recognition system according to claims 1 and 9, and wherein said speech recognizer comprises an active range updater to determine the beginning and end of each of said active ranges (active range updater-new active list 205 from Fig. 22, Paragraph [0146] states that *once all the active states on the current active list 203 have been processed, the new*

active list 205 generated during the processing in step s77 (from Fig. 24*) is changed, in step s83, to be the current active list 203 for the next frame f_{k+1} of the input utterance to be processed.* Paragraph [0147] gives an overview of the processing performed in step s77 using as examples active states s_7 and s_5, which are the ends of paths p1 and p2 respectively, as shown in Fig. 23. *Fig. 25 shows part of the two valid paths p1 and p2 that end at states s_7 and s_5 respectively at the current frame f_k. The dashed lines in Fig. 25 show the ways in which each of the two paths p1 and p2 may propagate at the next frame f_{k+1}. Therefore, the cumulative distance of path p1 (which is stored in active state s7) is copied into the exit state S_D. As indicated by dashed lines 215, 217 and 219 path p1 can also propagate to state s_9, state s_8 and state s_7 respectively. Therefore, the cumulative distance of path p1 is also copied into these states. States s_9, s_8 and s_7 are then added, in descending order, to the new active list 205.).*

As per claims 8,16 and 39, Tzirkel-Hancock et al. teach the speech recognition system according to claims 1 and 9, and the method of recognizing speech according to claim 31, comprising a state buffer storing all of said states in a fixed order and their active/inactive status (state buffer-current active list 203, Paragraph [0142] states that *[t]he word model 201 also has associated therewith a current active list 203 for the current frame f_k which lists, in descending order, the states in the word model that are at the end of a valid path for the current frame f_k. Therefore, each state in the current active list 203 will store the cumulative distance of the valid path that ends at that state*).

As per claim 36, Tzirkel-Hancock et al. teach the method of recognizing speech according to claim 31, said determining comprises determining the beginning and end of

each of said active ranges (Paragraph [0145] states that *[i]n step s73* (of Fig. 24) *the system then checks to see if there are any active states in the current active list 203. In other words, a check is made to see if there are any valid paths ending in the current word for the current frame f_k.* Also as stated in paragraph [0143] *the seven valid paths p1 to p7* (as shown in Fig. 23) *end at word model 201 states s_7, s_5, s_4, s_3, s_2, s_1 and s_0 respectively, and it is these end states of the valid paths that are listed, in descending order, in the current active list 203.* It is inherent, from Fig. 23, that each valid path or "active range" has a beginning and an end, for example for active state s7 on the current active list 203, s7 represents the end state or "end of active range" of valid path 1 (referred to as p1 in Fig. 23) and s4 represents the beginning or "start state" of valid path 1. As another example, active state s5 on the current active list 203, represents the end state of valid path 2 (p2) and s2 represents the start state of valid path 2.).

3. Claims 17 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Robinson (US Patent 5,983,180).

As per claim 17, Robinson teaches an active range Viterbi calculator comprising:

means for retrieving active ranges for a current frame (Col. 12, lines 52-63, *A pruning algorithm that increases the speed of the tree search algorithm. In the time-first tree search technique pruning is defined as the time range over which a particular node in the tree is active. Typically both the start time and the end time of this range will increase by the average phoneme duration and indeed the start time must increase by at least the minimum duration of the phoneme (1 frame in these examples). The*

function of the pruning algorithm is to make this time range as small as possible such that it contains the best path.); and

means for performing Viterbi calculations only on states within said active ranges (Fig. 15 demonstrates a series of steps that use the Viterbi algorithm (equation (5)) and the pruning algorithm. In Col. 12, lines 55-63, Robinson teaches that *[i]n the time-first tree search technique pruning is defined as the time range over which a particular node in the tree is active. The function of the pruning algorithm is to make this time range as small as possible such that it contains the best path.* Also as stated on Col. 13, lines 20-22, *Fig. 15 illustrates the steps, which replace steps s10 to s14 in Fig. 14 when pruning is used*. Finally, Col. 11, line 58 cite that *Fig. 14 illustrates the process node subroutine of Fig. 13*, and Col. 11, lines 42-45 cite that *Fig. 13 is the flow diagram illustrating the steps carried out to accumulate the probabilities for the nodes in the tree in order to identify the word or words with the highest probability or probabilities.*).

As per claim 22, Robinson teaches an active range pruner comprising:

means for retrieving active ranges for a current frame (Col. 12, lines 52-63, *A pruning algorithm that increases the speed of the tree search algorithm. In the time-first tree search technique pruning is defined as the time range over which a particular node in the tree is active. Typically both the start time and the end time of this range will increase by the average phoneme duration and indeed the start time must increase by at least the minimum duration of the phoneme (1 frame in these examples). The function of the pruning algorithm is to make this time range as small as possible such that it contains the best path.*); and

means for performing pruning operations only on states within said active ranges (Fig. 15 demonstrates a series of steps that use the Viterbi algorithm (equation (5)) and the pruning algorithm. In Col. 12, lines 55-63, Robinson teaches that *[i]n the time-first tree search technique pruning is defined as the time range over which a particular node in the tree is active. The function of the pruning algorithm is to make this time range as small as possible such that it contains the best path.* Also as stated on Col. 13, lines 20-22, *Fig. 15 illustrates the steps, which replace steps s10 to s14 in Fig. 14 when pruning is used.* Finally, Col. 11, line 58 cite that *Fig. 14 illustrates the process node subroutine of Fig. 13*, and Col. 11, lines 42-45 cite that *Fig. 13 is the flow diagram illustrating the steps carried out to accumulate the probabilities for the nodes in the tree in order to identify the word or words with the highest probability or probabilities.*).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 7, 15, and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tzirkel-Hancock et al (US 2002/0032566), as applied to claims 1, 9, and 31 above, and further in view of Robinson (US Patent 5,983,180).

As per claims 7 and 15, Tzirkel-Hancock et al. teach the speech recognition system according to claims 1 and 9, but they don't specifically mention said speech

recognizer comprising an active range Viterbi calculator and an active range pruner to process states within active ranges. However, Robinson teaches a dynamic programming search for the most likely state sequence [which] *can be expressed as finding the maximum sum of log emission and log transition probabilities known as the Viterbi algorithm* (Col. 10, lines 21-25, also equation (5) of Col. 10). Robinson also teaches a *pruning algorithm that increases the speed of the tree search algorithm. In the time-first tree search technique pruning is defined as the time range over which a particular node in the tree is active* (Col. 12, lines 52-57). Fig. 15 demonstrates a series of steps that use the Viterbi algorithm (equation (5)) and the pruning algorithm. *These steps replace steps s10 to s14 in Fig. 14 when pruning is used* (Col. 13, lines 20-22). Finally, *Fig. 14 illustrates the process node subroutine of Fig. 13* (Col. 11, lines 58), *which is the flow diagram illustrating the steps carried out to accumulate the probabilities for the nodes in the tree in order to identify the word or words with the highest probability or probabilities* (Col. 11, lines 42-45).

It would have been obvious to one having ordinary skill in the art to have used the features of a Viterbi algorithm and a pruning algorithm as taught by Robinson for Tzirkel-Hancock et al.'s speech recognition system because Robinson provides recognition method and apparatus (applied to speech recognition) for recognizing data comprising sequential data units represented by sequential tokens grouped into one or more items (Col. 1, lines 5-9) and further to reduce the memory requirements for the search space to calculate the accumulated probabilities (Col. 2, lines 44-46).

As per claim 37, Tzirkel-Hancock et al. teach the method according to claim 31, but doesn't specifically mention wherein said performing comprises performing Viterbi calculations. However, Robinson's Fig. 15 demonstrates a series of steps that use the Viterbi algorithm (equation (5)) and the pruning algorithm. Also as stated on Col. 13, lines 20-22, *Fig. 15 illustrates the steps, which replace steps s10 to s14 in Fig. 14 when pruning is used.* Finally, Col. 11, line 58 cite that *Fig. 14 illustrates the process node subroutine of Fig. 13*, and Col. 11, lines 42-45 cite that *Fig. 13 is the flow diagram illustrating the steps carried out to accumulate the probabilities for the nodes in the tree in order to identify the word or words with the highest probability or probabilities.*).

It would have been obvious to one having ordinary skill in the art to have used the features of a Viterbi algorithm as taught by Robinson for Tzirkel-Hancock et al.'s method of recognizing speech because Robinson provides recognition method and apparatus (applied to speech recognition) for recognizing data comprising sequential data units represented by sequential tokens grouped into one or more items (Col. 1, lines 5-9) and further to reduce the memory requirements for the search space to calculate the accumulated probabilities (Col. 2, lines 44-46).

As per claim 38, Tzirkel-Hancock et al, as modified by Robinson, teach the method according to claim 37, wherein said performing comprises reviewing the output of said performing Viterbi calculations and marking states within said active ranges as active or inactive (Robinson's Col. 13, lines 5-20, describe the process of Fig. 15 for the example of Fig. 16, "*Assuming the tree states of ae are active then six states of b are computed, the last of which (shown as dashed lines) falls below the local pruning*

threshold. This defines a minimum and maximum time for any future extensions, which are then, pruned using the global heuristic. Firstly the minimum time is extended until a node is found which exceeds the global pruning threshold, and then the maximum time is decreased until it too falls below the pruning threshold. In this example both extremes are pruned by one node which results in the three b nodes (O(3) to O(6)). Finally, the new accumulated log probabilities, $\phi_i(t)$, for this layer are compared with a global array storing the best values seen for this time (independent of their position in the tree) and this array of best values is updated. The array of pruning thresholds may then be updated from the array of best log probabilities (or may be computed on the fly)."

In this description the "accumulated log probabilities, $\phi_i(t)$" represent the Viterbi calculation as stated in Col. 10's equation (5) and lines 21-25, *the dynamic programming search for the most likely state sequence can be expressed as finding the maximum sum of log emission and log transition probabilities and this id the known Viterbi algorithm."* It is noted that Robinson doesn't specifically mention marking the states within said active ranges as active or inactive, however, it is inherent, when the array of best values is updated, that the values stored have been compared to a pruning threshold, in other words marked active, otherwise, values not stored are marked inactive.).

6. Claims 18-21 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson (US Patent 5,983,180), as applied to claims 17 and 22 above, and further in view of Tzirkel-Hancock et al. (US 2002/0032566).

As per claims 18 and 23, Robinson teaches the system according to claims 17 and 22, but he doesn't specifically mention having at least one active range per reference word. However, Tzirkel-Hancock et al.'s Fig. 22 shows word model 201 and active list 203 having 7 active ranges for the reference word model 201.

It would have been obvious to one having ordinary skill in the art to have used the feature of having at least one active range per reference word as taught by Tzirkel-Hancock et al. for Robinson's system because Robinson provides a pattern matching method and apparatus which uses a dynamic programming matching technique, wherein the active patterns of models are processed in reverse sequential order, and wherein a last active pointer is used to control the required processing of the patterns (Paragraph [0008]). In a preferred embodiment the pattern matching method is used in a speech recognition system (Paragraph [0010]).

As per claims 19 and 24, Robinson, as modified by Tzirkel-Hancock et al., teach the system according to claims 18 and 23, wherein each said active range has a start state and an end state and wherein said start state is the first state to be processed in said word for said current frame and said end state is the last state to be processed in said current frame (Tzirkel-Hancock et al.'s Paragraph [0143], *Fig. 23 shows seven valid paths p1 to p7, which represent seven possible matching between the incoming word and the word model 201 up to the current frame* f_k. *As shown, the seven valid paths p1 to p7 end at word model 201 states* s_7, s_5, s_4, s_3, s_2, s_1 *and* s_0 *respectively, and it is these end states of the valid paths that are listed, in descending order, in the current active list 203.* It is inherent from Fig. 23 that each of the end states s_7, s_5, s_4, s_3, s_2, s_1

and s_0 have a starting state associated with them and as can be seen in Fig. 23, for example, for end state s_7, there is a starting state s_4 associated with it, and end state s_5 has starting state s_2 associated with it, and so on.).

As per claims 20 and 25, Robinson, as modified by Tzirkel-Hancock et al., teach the system according to claims 18 and 23, wherein each said active range minimally comprises the active states within said reference word (Tzirkel-Hancock et al.'s Paragraph [0142], *The word model 201 also has associated therewith a current active list 203 for the current frame f_k which lists, in descending order, the states in the word model that are at the end of a valid path for the current frame f_k. Therefore, each state in the current active list 203 will store the cumulative distance of the valid path that ends at that state.*).

As per claims 21 and 26, Robinson, as modified by Tzirkel-Hancock et al., teach the system according to claims 20 and 25, also comprising at least one inactive state not able to become active in said current frame (Tzirkel-Hancock et al.'s Fig. 23 shows state 6 of word model 201 which is inactive and is not able to become active in frame f_k.).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

8. Schwartz et al. (US Patent 5,241,619) provides systems for and methods of finding the several most likely word sequences from an observed acoustical utterance based upon acoustical and statistical models of language.

9. Baker (US 2004/0158464) provides a speech recognition method and system, which includes receiving a sequence of acoustic observations. The method and system also include detecting each occurrence of a set of prescribed patterns that occurs in the sequence of acoustic observations.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie Lennox whose telephone number is (571) 270-1649. The examiner can normally be reached on Monday to Friday 7:30 am - 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on (571) 272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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